ABSTRACT OF THE DISCLOSURE

Apparatus and method for performing IEEE-rounded floating-point division utilizing Goldschmidt's algorithm. The use of Newton's method in computing quotients requires two multiplication operations, which must be performed sequentially, and therefore incurs waiting delays and decreases throughput. Goldschmidt's algorithm uses two multiplication operations which are independent and therefore may be performed simultaneously via pipelining. Unfortunately, current error estimates for Goldschmidt's algorithm are imprecise, requiring high-precision multiplication operations for stability, thereby reducing the advantages of the pipelining. A new error analysis provides improved methods for estimating the error in the Goldschmidt algorithm iterations, resulting in reductions in the hardware, improved pipeline organization, reducing the number and length of clock cycles, reducing latency, and increasing throughput.